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Opinions expressed by authors in this magazine are not necessarily those of the Association.

Effort should produce a

What Manage

► Systems and procedures work is not new. For as long as there has been organized activity, the most successful leaders and managers have been those who could control complex situations by identifying and coordinating combinations of simple actions within them. Of course, much more than just this type of control goes into effective leadership, but it is a necessary element. What is new, is the gradual development of the concept of the professional systems and procedures man. Sometimes one hears that it is the gradual *recognition* of systems work as a professional area of business administration. It is more pleasing to a man to say to himself and to his fellows, "I am a professional, and I am being gradually recognized as such," than it is to say, "I am gradually learning to conduct my affairs in a professional way." There is a difference here. These two statements place the burden of proof on opposite sides of the fence.

Please do not conclude from these statements that I am underrating the value of the systems field. I spent too much time in it myself to have any desire to do that. I think those who are in systems work are fortunate indeed to be able to contribute to the formation of a new kind of work. New work is more exciting than the following of a prescribed course of study, the passing of a set of minimum requirements, or the slow struggle to get established in a more static sort of work.

A Period of Development

In the early days of the medical arts, the people who called themselves doctors ranged all the way from those who tried to operate on a professional level and steadily pushed back the frontiers of medical knowledge to barbers, bug collectors, and outright frauds. To bring the medical profession from that point to the status it now enjoys must have been a period full of false starts and frustrations as well

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useful result

by Kenneth C. Tiffany

ment Expects of Systems and Procedures

as one of tremendous achievement. It may be that systems work is now in a similar period of development. There are systems people who try to operate on a professional plane, and there are those who work at the barber and bug collector level. In all fairness to the latter, it must be said that many times they operate at this level because their managements will not permit a greater scope.

This situation leads directly to the focal question: "What does management expect of systems and procedures?" It is obvious that because of individual differences, management expects as many different things of systems and procedures as there are managers in a position to expect. It may be equally obvious that management expects the job of management to be smoother, more effective, and more economical with the help of a systems group than the job would be without one.

It is perhaps more to the point to ask: "What *should* management expect of systems and procedures people?" Since we are faced here with a process of mutual growth and appreciation, we need to establish a set of goals.

A Set of Goals

Systems people should be concerned with the efficiency and cost of administrative systems wherever they are found in a business. They must be concerned with producing for a company the most profitable return on its clerical and data-handling investment. Systems people must be concerned with establishing a clear-cut and well-publicized set of responsibility-statements for units of the organization and for positions therein, with clear definitions of relationships among them. Finally, they must be concerned with setting up free-flowing channels for the information that is necessary to administration. They must also be concerned with dredging and maintaining the channels to keep them from being clogged with driftwood.

Now let us consider some other aspects of an analyst's work which relate more directly to management's appreciation of this function and, conversely, to an analyst's better appreciation of the problems of management. In this way, we can get at some thoughts as to what management *should* expect of systems and procedures.

In addition to an ability to use certain basic skills of communication, analysis, and problem solving, an analyst is expected to perform to a certain degree in such intangible areas as *administration, technique,* and *attitude.*

Administration

Systems people should be expected to know what staff work is and how to conduct it. While they may not infringe upon the line authority of the managers served, they still must get results. The whole art of staff work lies in producing improvements without enjoying the right to demand them.

Systems people should be expected to work in accordance with a planned program. The rise of systems-work situations is unpredictable, but this is not an excuse for operating on a hand-to-mouth basis. Objectives and schedules should be set just as they should be in other parts of the business. In fact, plan for unpredictable work. Allow for it by scheduling, say, only 65 per cent of the available time on foreseeable and known projects. Schedule the rest for service and emergency projects.

A systems and procedures unit must be able to gear itself to the current needs of a business. In a time of expansion and reorganization, for example, review and improvement of current systems may be entirely disregarded. At such a time the need to create procedures for new areas and functions is more pressing. This is not bad. The cost saved by avoiding the introduction of hit-or-miss methods for new areas will probably be greater than the cost saved by spending an equivalent time on a review of current systems. A system which has been in use for some time has the obvious warts knocked off anyway. When conditions stabilize themselves, review and improvement of current systems then become the order of the day.

A systems person should know the organization of his company. He should know thoroughly the rules by which the organization works, for his improvements should be such as to strengthen the structure and operation of his organization. If there are structural weaknesses, he should engineer a change.

It is important for any employee to know what sort of things he decides or carries out himself, which ones he carries up for review after the fact, and on which ones he requests permission before the fact. It is even more important, because of the sensitive nature of much of his work, for a systems person to understand clearly about delegation practices between him and his superior.

An analyst should have a clear concept of what the job of managing is. This is necessary partly so that he can use his own resources to the fullest. He can serve his customer better if he knows what he must do, what he should do, and what he can do. An analyst must be able to help his customer make a distinction between what is necessary and what is nice.

A systems analyst should be able to measure the results of his work where it is reasonable to do so. He should not waste time on measurements and estimates when they are too fuzzy to have meaning. One can usually count on management to appreciate a position based on intangibles, for usually many of their actions are even more unmeasurable than an analyst's. Few things can discredit one more quickly than a guess or a rationalization disguised as a measurement. An honestly admitted "guesstimate" is better than a fabricated proof, for then people know something of the odds and of the shifts that are desirable.

Technique

The technique of systems work has to do mostly with how the analyst affects others, and how well he can get results through them.

One of the most common topics for any group of staff people is: "How can we get executive management support?" It is implied that if one can get executive management support, all other problems of getting results are over. This is too easy. Executive management will not give blanket support to any staff area; they should not be expected to. They will give support on specific issues, but this usually tosses the ball right back. The systems analyst must package his product so as to gain management attention and, of course, eventual approval.

Fundamentally, the problem is one of gaining confidence — confidence in oneself and the confidence of others. This can be accomplished in three ways:

(a) *Be prepared.* Develop good answers to problems that operating people have already recognized as problems. One can then skip the necessity of first convincing them that they have a problem.

(b) *Give service.* But do not promise a service unless you are prepared to give it. This means that an allowance in the schedule must be made for emergencies and minor problem situations.

(c) *Follow through.* It will hurt a program seriously if a systems customer is left holding a half-filled bag.

If executive management support is needed on specific issues, ask for it. First, however, make sure that the issue is big enough to justify the time that will have to be taken.

It is necessary that a systems person know where his company is going, that is, what its goals are. All of the systems work should then press forward in the direction planned. Develop an appreciation of the technique of applying a leaning type of pressure. This is a continuous, unobtrusive pressure to move in the right direction. Spectacular breakthroughs are gratifying but rather rare in systems work. Steady progress on a broad front may not give an analyst publicity, but it will produce a more enduring result.

A sense of timing is very important. Develop it. Know when to introduce an idea, when to let it lie, when to resurrect it, and when to drive it home. A systems person should always be a little ahead of his time but not so far as to lose contact. He should certainly never fall behind. Compromise between being exhaustive and timely. This suggests the need of high personal productivity in a good systems man.

Since the systems person's products are primarily ideas, he must be able to express ideas well. Stick to main issues. Keep the package clean. Sell the cereal and not the premium.

Attitude

To operate in the way just suggested, a systems analyst should develop certain personal attitudes. He needs a philosophy that will enable him to live with the frustrations inherent in systems work: He needs to be able to take a lost "sale" in stride. He needs to be able to keep himself and the business in a healthy perspective.

To do a job well, one must recognize his limitations. A personal opinion is of value to the extent that it is based on objective analysis, and to the extent that it is supported by the operating people served. There is plenty of opportunity to be creative in systems work without imposing one's opinions upon others in areas in which they are paid to be authoritative. One may aspire to be a messiah but never a dictator.

Systems people cannot afford jurisdictional jealousies. Systems and procedures is everyone's field. Systems analysts are the prime movers in the area but they can not do it all alone. They should not want to. The more others systematize their own operations, the more freedom an analyst has to move into that area in which a neutral third party is a real necessity.

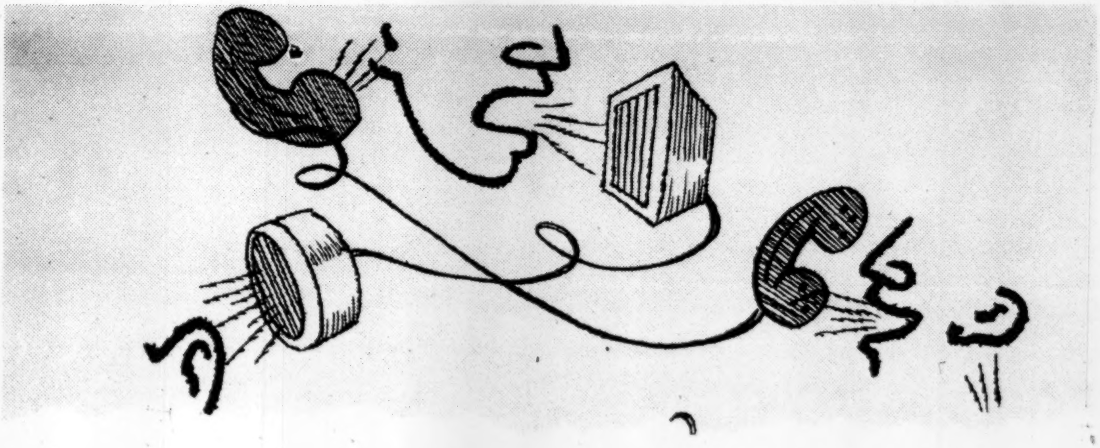
A most important attitude for a system man is control of fear. He is not accountable for his own creation; just for his actions. The fact that he has the job is evidence that management believes that he is necessary. An apologetic or fearful approach makes an apology of the job. Constant concern over justifying an analyst's existence makes others wonder if he is necessary. Although often involved in sensitive and difficult problems — problems of policy and organization can be touchy — he cannot fear the problem. Some fear, of course, is healthful. For example, a healthy form is to fear clumsy or out-of-bounds handling of a problem. Big problems and little problems differ often in the stakes involved and in the risks involved, if wrong. The tools of systems analysis are applicable to both. The systems man cannot lose faith in his techniques because an important problem has been given to him. The fact that it was given to him is evidence that management thinks that his efforts are likely to produce a useful result.

There is one last thing that management should expect of a systems person. Develop juniors to step into your shoes, because if you can live up to all the expectations just discussed, there are larger shoes waiting for you. **s/p/a**

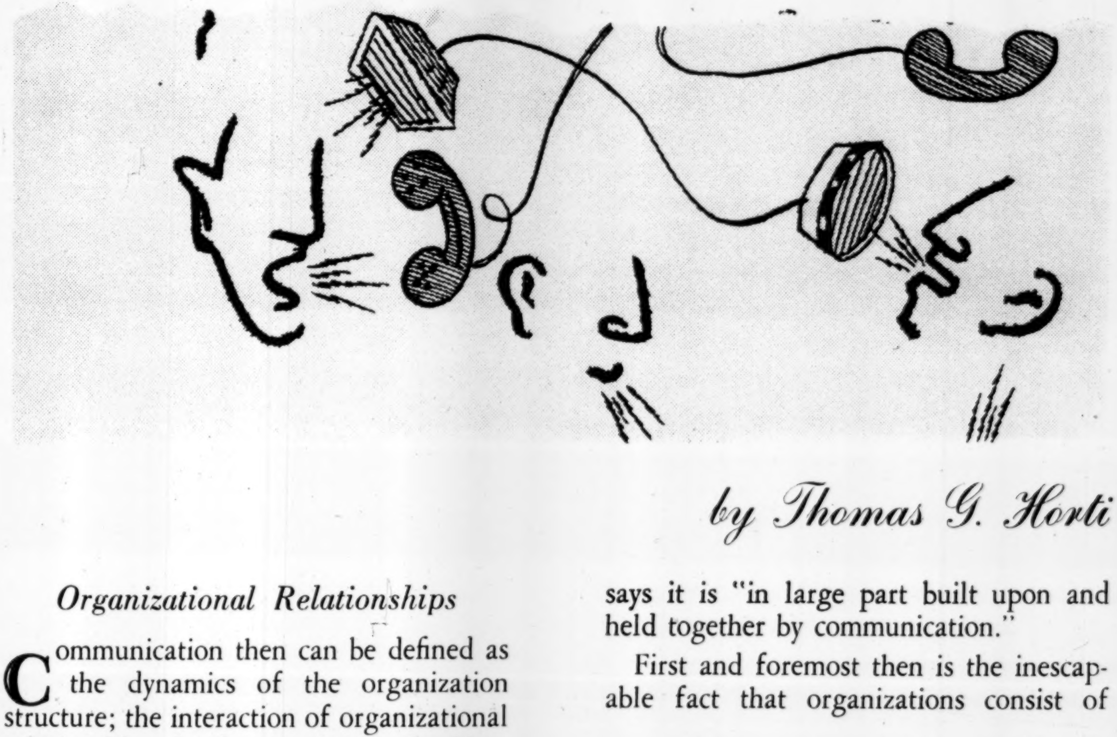
Organization Structure and Communication

▶ Organization can be defined as relationships established between members of a group either by declaration (appointment, hire), or by group consent (election, committee selection). These organizational relationships tend to be formal; personal interaction is dictated more by the relative positions involved than by the personalities occupying those positions. An example is the positional relationship of supervisor and employee which remains basically the same whether the supervisory position is filled by a martinet or by a "good Joe." There is some modification of the relationship by the personalities involved, but basically the type and extent of the communication is defined by relative organizational positions.

To a social scientist, any attitude or action of a person to which another person reacts is communication. Since communication in its broadest sense is information transfer of any kind, it can consist of even a frown, a shrug, or complete silence. In business, however, it is usually considered in terms of more formal media, such as commands, reports, conferences, and publicity releases.



—Are They Separable?



by Thomas G. Horti

Organizational Relationships

Communication then can be defined as the dynamics of the organization structure; the interaction of organizational relationships. In *Communication In Management,*[1] Redfield calls the organization, as illustrated by an organization chart, a "positional communications network." He says it is "in large part built upon and held together by communication."

First and foremost then is the inescapable fact that organizations consist of

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[1] C. E. Redfield, *Communication in Management,* University of Chicago Press, 1953.

people. Personalities, we recognize, modify communication, even though slightly, in a given organization. And, the higher the positions are in the organizational structure, the greater the modification possible due to personality.

It is also to be noted that corporations have personalities of their own. In a recent spectacular court case, the presiding judge referred to a corporation's "moral's" and "ethics." The concept that an organization, be it corporation, government agency, church group, or social club has a personality is entirely not new. It is also recognized that this personality results from the attitudes and actions of individuals in the organization (particularly the officers). How does this "personality" affect organization structure and communication?

Since, according to our definitions, organization structure and communication are interdependent, it follows logically that an arbitrary change in one without a compensating change in the other could result in (a) breakdown of the formal system, and (b) creation of unofficial or "bootleg" systems. Many companies face this problem today as they stand on the threshold of automation. The reputation of electronic equipment is such that, in the absence of prompt communication from management, the "grapevine" works overtime filling the gap, and good employees panic. Some resign their jobs rather than wait to be "replaced by a machine." When the policy decision (to automate) was made, an immediate change in the management-employee relationship also took place. Even if no organizational changes are contemplated, all individuals in the organization anticipate changes in their status. If a management bulletin, circular, or group indoctrination session is not arranged, the formal system breaks down and the "grapevine" takes over. This lack of balance between structure and communication is usually transitional. It eventually becomes resolved either by management action which rectifies the imbalance, or by gradual group acceptance of the facts as they emerge. The natural transition, however, may play havoc. A planned and carefully supervised one is better.

Decentralization

Of course, there are other ways in which the balance between organizational structure and communication can be upset. In a large service organization, for instance, let us assume that the organization chart shows a completely decentralized plan of structure. Each major service department is set up for a particular kind of service or for a certain customer and is complete in itself as regards purchasing, storage, and inspection. Large jobs, with work cutting across departmental lines, are handled by permanent committees composed of representatives of each department. Despite this decentralized structure, however, top management does not relinquish its central authority. Top management approval is required for all real actions. With this contradiction between structure and communication, the committee system could not function. Each departmental representative would be more concerned with avoiding responsibilities and "passing the buck" than with the company-wide picture. Eventually a "bootleg" communication system would develop between various departments in which working agreements were arrived at on a person-to-person basis, often without the knowledge even of the department heads involved. Such a system would play havoc with published procedures and with the use and distribution of authorized forms. They would result in duplication of labor and material, thereby increasing unit costs. Employee morale would be poor, and turnover high.

Centralization

Swinging the pendulum over to the other extreme, let us consider the example of another company, a manufacturing concern, whose organization structure (on paper at least) was centralized. In practice, however, responsibilities were poorly defined, and a considerable amount of operating freedom and authority were allowed. As the lines for reporting were left vague, considerable duplication of effort went unchecked, to the point where some departmental systems were not only different but were in actual conflict with systems for the rest of the company. Because of the free hand allowed department heads, the efforts of central staff departments to standardize systems was ineffective. They did not have sufficiently strong and specific backing from the top to lend weight to their recommendations. One department was actually able to maintain its own (different) payroll system, administered by a payroll staff of its own. Because of this confusion in communication and lack of organized reporting, interpersonal and interdepartmental politics entered into all phases of the company's activities, sometimes to the detriment of its best interests. Employee morale varied widely, depending on the political position of the department.

Structure - Communication Problems

Waste engendered by structure-communication problems becomes a real headache to the top echelon responsible for over-all performance of an organization. Expense caused by duplication of effort or equipment is self-evident. There is also the expense of increased processing time. G. J. Feeney writes[2]: "Every extra day that is required to process a purchase requisition adds to procurement lead time and ultimately raises inventory levels. Every day required to process a sales order adds to the minimum delivery time and subtracts from the over-all value of the company's product. The time required to cash checks creates a reservoir of unavailable money, increasing a company's need for working capital. Almost every office operation involves direct penalties for processing delays.

Consider, for example, the role of communication speed on a large ship, such as a destroyer. If it took ten minutes to get a message from the combat information center to the bridge and another ten minutes to get a message from the bridge to the engine room, the combat effectiveness of a destroyer would be almost nil. In fact, it would be nearly impossible to get such a ship into a harbor. This is not too unlike the company whose executives get January information in March and April. How quickly can a company react to changes in its operating environment?"

The important thing today is to give management the information it needs on time. No matter what kinds of electronic "brains" are installed or how elaborate the processing is, the benefits of automation and improvements of all types are directly dependent upon the quality of communication. It is a challenge to management to set up the organization and communication best suited to these ends. Perhaps the unique organization is the one with the optimum communication machinery for its structure and a management that adheres to it.

The Corporate Personality

Just as we learn to live with the faults of individuals we deal with, we learn to live with the faults of the corporate "personality" as well. Correction of these faults must be done carefully. They may involve a structure-communication relationship. Such personality changes cannot, however, be made quickly. For example, a Long Island manufacturing firm, with a poor record of labor relations, hired a public-relations firm to help with a labor-relations campaign prior to union contract negotiations. The inconsistency of the tone of the campaign with management's normal voice was such as to arouse distrust among the employees, and it was later cited as one of the contributing factors to the breakdown of negotiations. A costly strike resulted.

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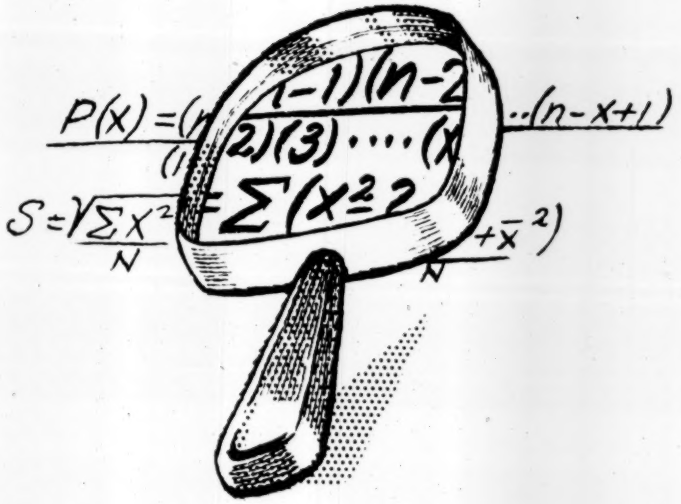
[2] G. J. Feeney, "Waiting Lines in Office Operations," *Systems & Procedures*, February, 1956, p. 10.

Although organization structure (as shown on an organization chart) and communication are in fact interdependent, they are separable. Each can be separately manipulated, but every time one is changed in any way, the balance is shifted, and a compensating change is needed in the other to restore the original relationship. The personality of the organization is reflected in both the structure and in the administrative communication network within that structure. In order to operate most effectively, the communication system must be tailored to the organizational structure and a consistent balance achieved and maintained. Since most organizations retain a degree of flexibility to enable them to adjust to market, labor, and supply conditions, provision should be made for *balanced* changes to be affected in structure and communicating machinery when such changes become necessary.

The Responsibility

The responsibility for a continuing review and consideration of these changes is being delegated increasingly by top management to staff groups such as Industrial Relations and Systems & Procedures. In answer to external problems, such as, geographical considerations, changes in government, and labor or market conditions, these groups carry out their responsibilities by reviewing, planning, recommending new techniques, and modernizing equipment. Internal problems, inconsistencies in organization planning or communication, and problems in labor relations and customer relations can all be studied and reported by staff groups, but solutions can be made only by management decision or changes in management thinking. In both the illustrations above, of companies with structure-communication problems, no amount of procedural innovation or electronic "brains" can solve the basic problems either of communication systems unsuited to organization structure or of organization structure unsuited to management requirements. Only top level decisions, culminating in a new *balance* between an organization's structure and the communication machinery supporting it — both geared to management's requirements — will rectify these situations.

Today, more than ever, management faces a challenge: improved office and factory methods, automation, and scientific approaches to management such as operations research have not reduced management's responsibility. They have increased it. With all these tools at its disposal, it is incumbent on management to make bigger decisions faster than ever before. But, underlying all these advanced tools and concepts lies the well-balanced organization structure and the tailored communication system, without which management can never fully use the information it needs. So, to meet the challenge before it, management must be aware of its responsibility to the organization to set up and maintain a balanced structure and an effective communication machine before it can receive the optimum in performance and reporting that it wants in return. **s/p/a**



by Bruce Carlson

Operations Research—

Friend or Foe of Systems?

▶ Neither operations research nor systems people seem to be very well-informed about what the other group is trying to do. In operations research, in fact, there has been, until recently, little recognition that a systems profession is evolving apart from industrial engineering. Systems men, on the other hand, tend to look upon operations research as an interloper which in some way is threatening the sound growth of systems work. In this respect, systems people are not alone. Various gatherings of industrial engineers, management consultants, and accountants have all at some time or other expressed this point of view. There are those, however, who say that operations research is no interloper and that a close partnership developed between systems people and operations research can be beneficial to both.

The Systems and Procedures Association of America was formed in 1946 and today has a membership of about 2,500. The Operations Research Society of America was formed in 1952 and has about 2,000 members, about 800 of whom are in the field of military operations research work. It has been estimated that industry last year spent over $30 million on operations research activities, compared to less than $1 million five years ago.

A Basis for Problem Solving

The title *Operations Research* is an outgrowth of the initial application of various mathematical and experimental techniques borrowed from the physical sciences and applied to the analysis of military operations during World War II. It moved into industry after the War, when it was recognized that these same techniques could be applied to certain types of business and industrial operations. Basically, it involves applying the so-called scientific method to the evaluation of the factors bearing on a complex business or industrial problems and to the establishment of basic relationships among these

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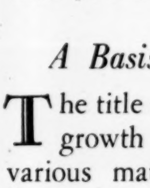

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factors so that the best solution to the problem can be developed. The problems to which it is being increasingly and successfully applied have existed for years. The idea of using these known techniques to seek better solutions to business problems, however, goes back at most 6 or 8 years. It does not matter very much whether we call it operations research, mathematical programming, operations synthesis, statistical decision-making, management science, or even systems analysis. It is the approach used that is significant and of interest and in which the potential for business lies.

Characteristics

Some characteristics of the operations research problem-solving approach that are worth mentioning shed some light on the relationship between operations research and system analysis.

All of us are familiar with the trend toward finer and finer subdivisions of the management function that have come about with the growth in size and complexity of both public and private enterprise. No one knows better than the manager of a systems and procedures unit in a large company how various line functions, such as production, marketing, and finance, often develop objectives of their own which occasionally conflict. Inventory management is a good case in point. Production scheduling in the face of limited facilities is another. The basic aim of operations research is to provide management with a rational basis for the solution of any problem which involves the interaction of the various parts of an organization so that the best interests of the organization as a whole may be served.

Operations research is concerned not only with finding a solution to a problem but also with finding the *best* possible solution, if more than one is possible, as is usually the case. Operations research men call this an "optimum decision," while a decision that may be best for any one function alone but not necessarily for the whole organization is called a "suboptimum decision." Operations research men generally describe these decisions in quantitative terms. Moreover, instead of being content with arriving at the optimum solution, they try to set forth various alternative solutions in the sequence of their desirability. They may even assign percentage values to each in terms of desirability compared to the optimum.

Types of Applications

The range of business problems on which the operations research approach has been tried is wide, but there are about a half dozen types of processes into which most of them fall. A recent textbook[1] summarizes them under the following headings:

1. *Inventory Processes.* Balancing carrying costs against order, set-up, delay, stock-out and other costs, and using techniques such as economic order, quantity analysis, and mathematical programming.
2. *Allocation Problems.* Arising when there are a number of alternative activities or ways of carrying on these activities versus limited facilities for the various alternatives. Linear programming and other mathematical tools are useful here.
3. *Waiting-time Processes.* Arrival of units which require service at one or more service units. Queuing theory, line-balancing theory, and sequencing theory are used.
4. *Replacement Processes.* Involving the deterioration or failure of equipment and the timing of replacement

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[1] Churchman, Ackoff, and Arnoff, *Introduction to Operations Research,* New York: John Wiley & Sons, 1957, pp. 15-17.

so as to balance the cost of replacing against loss of efficiency from not replacing.

5. *Competitive Processes.* Those in which the efficiency of a decision by one party is decreased by the counter-decision of another party. This was one of the most important military problems and was largely responsible for the development of the mathematical theory of games.
6. *Combined Processes.* Processes such as production scheduling, which usually combines inventory, waiting-line, and often allocation models into a single system model.

A Mathematical Model

There has been growing agreement in the last couple of years that the steps in methods used in operations research studies go something like this:

1. Formulate the problem.
2. Construct a mathematical model to represent the system under study.
3. Derive a solution from the model.
4. Test the model and the solution derived from it.
5. Establish controls over the solution.
6. Put the solution to work; implement it.[2]

Notice that except for the emphasis on building a mathematical model of the operation, this approach is not unlike that used in systems analysis. It involves careful fact-finding, detailed analysis of facts, and putting a solution into effect. The significant difference lies in the fact that operations research uses a highly quantitative, often mathematical, approach, which goes beneath the surface and accepts few conclusions until specific effects can be traced back to specific causes. By learning more about cause-and-effect relationships, an operations research man often learns to vary a cause and get the same effect at less cost or to get a more desirable effect at the same cost. It is also important to recognize that the mathematical model of an operation which results from an operations research study has a good deal of predictive value. By varying the values used in a model, it is possible to predict with fair accuracy what the effects of a change in the operation may be. This is one of the main reasons why operations research really has the "ear" of top management. Businessmen are usually more interested in where they are going than in where they have been.

A Developmental Problem

The fact that operations research uses analytical techniques from such diverse fields as mathematics, statistics, physics, economics, or biology makes it very easy for each person to see in operation research some things with which he is familiar and to say, "We have been doing that for years under another name." What this fails to recognize is the concept of applying the experimental method to business operations, including a willingness to devise new tools of analysis as needed. Of course, others too are willing to employ new tools and techniques when they become available, but they are more inclined to arrive at solutions by trying out what has proved to be workable in similar circumstances, modified to fit the problem at hand. They are generally content to reach *a* solution without trying to prove that it is *the best* solution among several recognized alternatives.

At the same time, the preoccupation of the operations research man with devising, testing, and perfecting his mathematical tools is also probably his greatest weakness, since he tends to leave to the manager the burden of how his methods are to be applied. Also, heavy emphasis on scientific methods and the use of a quantitative approach have, in some instances, led businessmen to place more reliance on the results than is warranted. Serious harm can be done to the reputation of operations research by a tendency of some practitioners to mystify the unitiated with high-sounding technical jargon and to claim objectivity and feasibility through the very nature of a quantitative treatment of what too often are subjective data.

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[2] *Ibid*, pp. 12-15.

Initially, operations research men did not recognize that the implementation of their solutions was important. They are now, however, beginning to recognize that their tendency to lose interest in a problem once it has been solved on paper is one reason why many of their solutions are either never put into use or yield disappointing results. The following quotation is of interest at this point:

> "During the introductory stage of a new development, staff must become to some degree operational and must remain in that relation until the new method has been successfully launched . . . It is a cold fact that acceptance, recommendation, and approval do not get a new method to the halfway mark."[3]

A Partnership with Systems

There are even encouraging signs that operations research is beginning to recognize its natural partnership with systems analysis. A reference to this partnership is as follows:

> "During this study it became apparent to the team that the paperwork and material-handling procedure for processing repair orders had never been integrated with the main business of machine tool parts production. The team suggested, therefore, that a study of the repair order processing be conducted to see if such integration was desirable and, if so, whether it could be effected. The suggestion was accepted and a special enlarged team was formed to do the job . . . A Systems and Procedures consultant was also employed by the company."[4]

As we consider the understandable lack of interest of an operations research man to become operational in following through on recommended solutions, we see also a relationship between him and the systems man. With his knowledge of data processing flow and cycles and his ability to spell out administrative details, the systems man is potentially an implementation force — the guy who makes the hypothesis of the operations research man work.

A Composite Result

Operations research then offers to the executive an array of alternative solutions to a given problem, arranged in order of probability of success, with one tagged as most likely to succeed. After this, the systems and procedures man takes over. The result is a composite.

Another way in which operations research and systems men can cooperate is through the application of new tools of analysis to problems in the system man's own backyard. For example, some very interesting work of this type has been done on filing and records retention systems. It is aimed at developing a set of basic principles for arranging files in terms of accessibility and frequency of reference and at using techniques heretofore not normally associated with filing problems.

We can conclude then that operations research and systems men, working together, can provide a more useful result than either group is likely to achieve on its own. In this sense, close cooperation between the two affords *optimum solutions.* To start making this cooperation a reality, systems men should do the following:

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[3] R. H. Roy, "On Operations Analysis," *Journal of the Operations Research Society of America*, June, 1956, p. 321.

[4] Churchman *et al.*, *Op. cit.*, p. 38.

1. Take the time to inform themselves more fully about what operations research is accomplishing in business, government, and elsewhere. Read at least a few of the many articles and reports that are appearing on operations research and its applications.
2. Subscribe to the *Journal of the Operations Research Society and Management Science* (get exact titles and addresses). Do not worry about the technical details and formulas they contain. It is possible to get the gist of these articles without going through the mathematics they involve.
3. Send one of your bright young men to an introductory course in operations research, or go yourself.
4. Urge your organization to hold seminars on the relationship between systems and operations research and not just on specific techniques such as linear programming. Invite joint participation in these sessions by the Operations Research Society of America.
5. Avoid giving the impression that there is a conflict between operations research and systems analysis. There is not. The sooner they get working together as a co-operating team, the better for each.

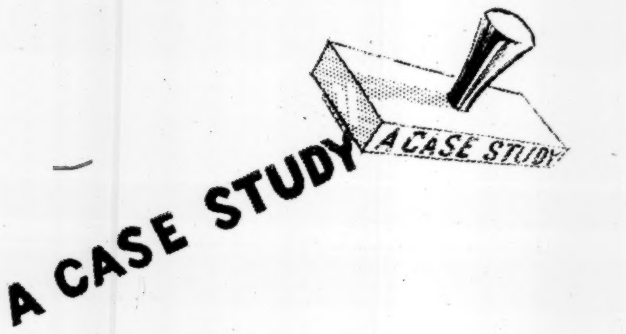
Both groups are staff activities concerned with line functions in an organization, and both have an important contribution to make to the smooth operation of an organization. Their techniques may differ but they can complement each other. This is the way it should be if both are to make their *optimum contribution* to progressive management. **s/p/a**

Analysis Stabilizers

The great unpredictable factor in systems analysis is the human being. Yet, a system cannot be considered apart from its activators. Consider carefully, therefore, the following.

1. Beware of change for the sake of change.
2. Before you suggest a change, consult the persons to be affected. Keep everyone informed who has a stake in the situation.
3. When you propose a change, you in effect say that the present method is wrong. People do not like to be told that they are wrong. A proposal for change should, therefore, be made with the utmost tact—slowly, gently, and patiently.
4. New things are generally considered to be radical. When a system is revised with the help of the operators, it is not so likely to seem new to them. They are more likely to accept it as their own.
5. When we see a thing often, it becomes commonplace, and we have a tendency to lose curiosity about it. This indifference to things *we know* frequently results in failing to observe that from which we can get ideas. In systems analysis, a re-examination of familiar things reveals new things.
6. Create a "why" atmosphere. Get employees to ask themselves "why" they perform the operations of their tasks as they do. This stimulates creative thinking, encourages suggestions, and lays the groundwork for acceptance of new ideas.
7. Give the same consideration to a poor suggestion as to a good one. When you reject a suggestion, explain why.
8. Protect your right to fail.

by Philip F. Cousar



A New Accounts Payable Installation

▶ The case study of the accounts payable system recently installed at Cook Bros. Equipment Co. is an interesting example of an integrated system designed to meet the specific requirements of management and at the same time to eliminate a substantial part of the paper work and cost of the previous system.

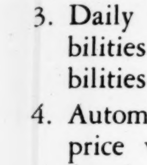
Cook Bros. Equipment Co. is a manufacturer, retailer, and distributor of heavy duty trucks and components, such as crane carriers, transit mixers, and allied heavy construction machinery. It distributes many of its products not only in the United States but on a world-wide basis. It also handles world-wide distribution for the Challenge Manufacturing Company of Los Angeles, California and Bryan, Ohio. Cook is organized into functional divisions, each division is divided into regions, and each region is divided into departments.

In designing the accounts payable system it was necessary to recognize and provide for the following:

1. Distribution of expenses by division, region and department.
2. Complete flexibility concerning disbursing of funds. It was mandatory that the system have the ability to make immediate disbursements as well as to accrue sums due creditors to be paid at later dates.
3. Daily information concerning liabilities incurred and when such liabilities would be liquidated.
4. Automatic computation of purchase price variance on parts purchased for the manufacturing division.

Philip F. Cousar, Accounting Systems Supervisor, devised the system with the assistance of representatives of the equipment companies that were involved. Both the Company Controller and a supervising accountant furnished valuable suggestions concerning the system.

An accounting machine and an intercoupler were purchased and connected to a card punch. The system works as follows:



Philip F. Cousar is an Accounting Systems Supervisor for The Cook Bros. Equipment Co., Los Angeles 65, California, where he has been employed for six years.

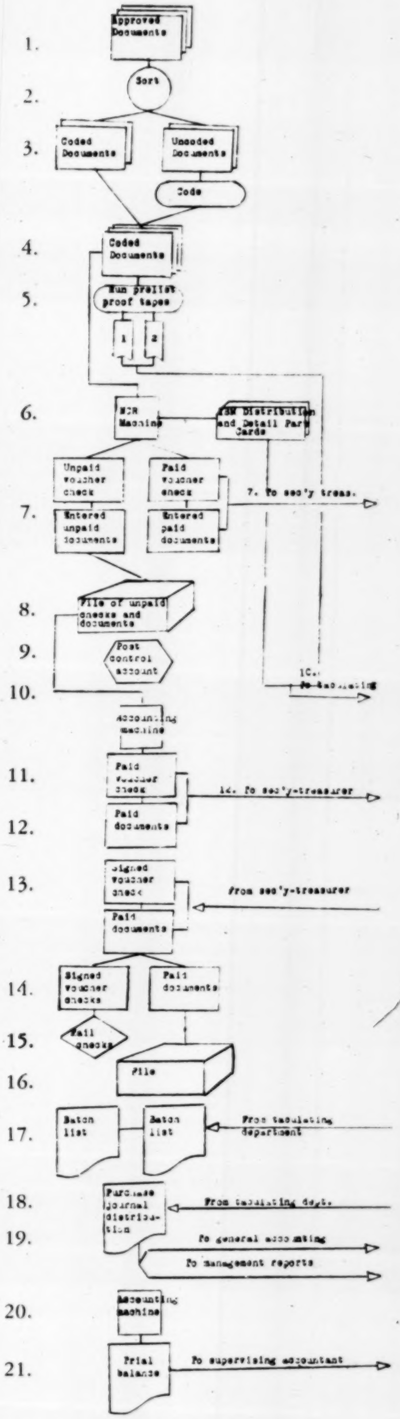
PROCEDURE CHART No. 100

APPLICATION: To accounts payable operations. Machine Accounting Section Functions.

COMPANY. Cook Bros. Equipment Company.

OPR. DESCRIPTION

1. Receive approved documents. (In most cases documents have been coded).
2. Sort coded documents from uncoded documents.
3. Code uncoded documents.
4. Alphabetize documents and group into batch. (In some cases it may be possible to combine Steps 2 and 4).
5. Run 2 prelist proof tapes.
   1 tape for all documents in batch.
   1 tape for plant inventory items.
6. Enter all documents in batch on accounting machine. Certain documents may be paid at this time.
   Distribution and detail part cards are automatically produced.
7. Send paid voucher check and supporting documents to sec'y-treasurer for signature.
8. File unpaid voucher checks and unpaid documents alphabetically.
9. Balance journal to prelist proof tapes and post control account.
10. Send batch prelist proof tapes and cards for the batch to the tabulating dept.
11. At designated times during the month, remove certain unpaid voucher checks and documents from the file and pay the documents.
12. Send paid voucher check and supporting documents to sec'y-treasurer for signature.
13. Receive signed voucher checks and documents from sec'y-treasurer.
14. Separate signed voucher checks from documents.
15. Mail checks or distribute to proper person.
16. File second copy of check and documents alphabetically. File third copy of check numerically.
17. Receive batch proof lists from IBM. Check totals to control account and spot check distribution.
18. At end of month, receive purchase journal distribution from IBM. Check total to control account.
19. Send original purchase journal distribution run to general accounting. Send copy to management reports.
20. At designated times, prepare a trial balance of outstanding liabilities, showing approximate due dates.
21. Send trial balance to supervising accountant or person he designates.


1.
Approved Documents
2.
Sort
3.
Coded Documents
Uncoded Documents
Code
4.
Coded Documents
5.
Run prelist proof tapes
1
2
6.
NCR Machine
IBM Distribution and Detail Part Cards
7.
Unpaid voucher check
Entered unpaid documents
Paid voucher check
Entered paid documents
7. To sec'y treas.
8.
File of unpaid checks and documents
9.
Post control account
10.
10. To tabulating
Accounting machine
11.
Paid voucher check
12. To sec'y-treasurer
12.
Paid documents
13.
Signed voucher check
Paid documents
From sec'y-treasurer
14.
Signed voucher checks
Paid documents
15.
Mail checks
16.
File
17.
Batch list
Batch list
From tabulating department
18.
Purchase journal distribution
From tabulating dept.
19.
To general accounting
To management reports
20.
Accounting machine
21.
Trial balance
To supervising accountant

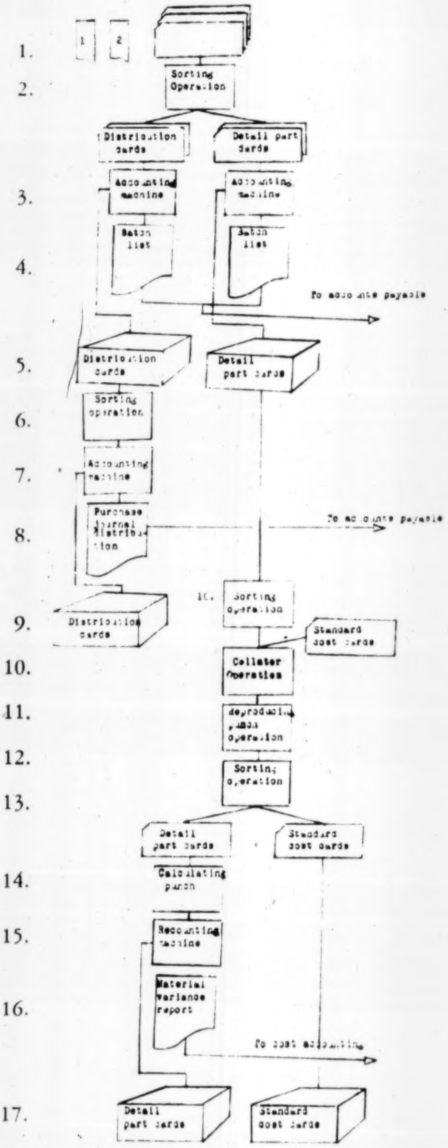
PROCEDURE CHART No. 101

APPLICATION: Accounts payable distribution and material variance computation.

COMPANY: Cook Bros. Equipment Company

OPR. DESCRIPTION

1. Accounts Payable sends 2 prelist proof tapes with batch of distribution & detail part cards to tabulating.
2. Sort distribution cards from detail part cards.
3. List distribution cards and balance to prelist proof tape; same operation for detail part cards.
4. Send batch list to Accounts Payable.
5. File cards separately until end of month.
6. At end of month, sort all distribution cards for month by account and department number.
7. List all distribution cards for the month. This is the purchase journal distribution report.
8. Send purchase journal distribution report to accounts payable.
9. File distribution cards in permanent file.
10. Sort all detail part cards for the month into part number order.
11. Merge standard cost cards and detail part cards.
12. Gang punch unit standard cost and part classification number into detail part cards.
13. Sort detail part cards from standard cost cards.
14. Punch extended standard cost on each detail part card.
15. Run material purchase variance report.
16. Send variance report to Cost Accounting.
17. File detail part cards and standard cost cards in separate permanent files.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Sorting Operation
Distribution cards
Detail part cards
Accounting machine
Accounting machine
Batch list
Batch list
To accounts payable
Distribution cards
Detail part cards
Sorting operation
Accounting machine
Purchase journal distribution
To accounts payable
Distribution cards
10.
Sorting operation
Standard cost cards
Collator Operation
Reproducing punch operation
Sorting operation
Detail part cards
Standard cost cards
Calculating punch
Accounting machine
Material variance report
To cost accounting
Detail part cards
Standard cost cards

The accounts payable section, consisting of two employees, enters approved, coded invoices on the accounting machine, posting them to a voucher check. At the same time, a general ledger distribution card is automatically punched. If the invoice covers parts purchased for the manufacturing division, a detail parts card is automatically punched for each different part purchased.

Certain vouchers are paid at the same time that invoices are being entered. At appropriate times during the month, the other vouchers are paid.

At the end of each month, the general ledger cards are sorted and listed by account number. This information is recorded in the general ledger and the cards are later used for divisional expense analysis.

The detail part cards are collated with standard cost cards and the purchase price variance is automatically computed and punched.

The detail part cards furnish valuable information concerning material usage and price trends. This system provides, at low cost, complete flexibility and current financial information with valuable detailed information provided as a by-product.

s/p/a

by Robert M. Anderson

A CASE STUDY
A CASE STUDY

Program for Control of Machine Utilization and Employee Efficiency

► At present, Carter Carburetor, Division of the ACF Industries, Incorporated, St. Louis, Missouri, is spending nearly a quarter of a million dollars a year in its Tabulating Department. By any standards, this is a significant amount and has become a major item of operating expense. The Department was organized in 1943 and has since grown into an 8,000 point installation, employing 32 operators and supervisors on two shifts.

Over a period of time, a number of studies have been made of this Tabulating Department to determine specific costs and to compare them with the results being accomplished. At first, the primary objective of the studies was to collect data that would measure the utilization of the equipment and the over-all effectiveness of the organization of the Department. The results of these initial studies pointed up certain basic requirement which had to be met for control of the cost and effectiveness of the Department. Foremost among these requirements was the need for written procedures for all of the operations performed in the Tabulating Department. The absence of such procedures had aggravated problems of employee turnover, cross-training, and methods improvement in the Department. The second requirement was for a method of controlling and measuring machine utilization, job cost, and employee efficiency.

The Problem of Control

The problem of control was given a great deal of thought. There was a normal hesitancy to impose a costly and time-consuming control system that might not actually control but only add to the cost of operation. With such expenditures as $8,000 a month for equipment rental, $3,000 a month for cards and supplies, and the salary of 32 employees, there was an understandable reluctance to add other items of cost, unless they were absolutely necessary.

Robert M. Anderson is Manager of Systems and Procedures of The Carter Carbureton Division of the ACF Industries, St. Louis, Missouri.

The total annual cost figure of a quarter of a million dollars a year quoted above for this department does not include the cost of floor space, facilities, or the plant property and equipment used in conjunction with the operation of the Department. Although the need to prorate indirect or overhead cost was recognized, this undertaking was delayed until an equitable and practical basis for distribution had been determined. Further operating costs had already resulted from the practice of prorating the cost of the Tabulating Department to the functions using its services. This practice created the need for rather comprehensive cost information on each of the major programs being performed within the Department. In reality, it operates like a service bureau. It charges for the machine and man hours used to perform its services. The problems of how to apply supervisor's time, cost of supplies, and other such expenses are aggravated when, at the same time, there is a desire to keep the cost of the control system to a minimum.

At Carter Carburetor the control system for the Tabulating Department consists primarily of three major categories:

(1) Operating Procedures
(2) Scheduling and Process Controls
(3) Work Measurement and Reporting

Operating Procedures

In resolving the problem of Operating Procedures, a basic policy was established: standard operating procedures must form the basis of any control system within the Tabulating Department. The need and the advantage of standard operating procedures within such a department should be apparent. Supervisors responsible for operating tabulating departments will, in general, quickly concede this point but justify their absence because of the urgency of the work, the problem of getting the procedures identified specifically, and the problem of keeping them current.

Although the need for operating procedures is fairly well resolved, the method for preparing and maintaining them is a major question. Carter Carburetor selected the method that was suggested in a manual from a business machine company. Individual process or job instruction sheets were prepared. The job instruction sheet is an integral part of every operating procedure. It is used to identify the job and to summarize its operations. Volume and time estimated to perform these operations are given. These facts form the basis for job standards which are beginning to and will, in the future, play an important part in a tabulating department control. The reverse side of the job instruction sheet can be used for an over-all flow chart of the operation. These job instruction sheets then provide supervision with an over-all picture of each job, its magnitude, and the standards for its performance.

Once the format of the operating procedures was decided, there was the problem of a container for them. It had to be relatively inexpensive, durable, and compatible to the form in which the operating procedures would be written. It was further decided that such a container must provide for containing test decks, test runs, samples of reports, plugboard diagrams, carriage tapes, etc. The folders finally accepted for the purpose were custom-made and cost about 80 cents each, including the cost of printing. Experience proved them to be easy to work with. They actually created an incentive for everyone in the Tabulating Department to maintain them properly.

Work Measurement and Reporting

The problem of measuring work so that the cost of operations and the effectiveness of the department could be determined was merely a matter of applying already existing techniques. Principally, a method was needed to record machine utilization and job loads. Of the various methods available, an individual employee time record of work performance was selected. It was thought that this method allowed for a better control over the completeness and accuracy of reporting. It enables supervisors to scrutinize more closely time records and to make any necessary corrections before using the data within the control system.

Control over individual employee time records was based on an "eight-hour check." Work was classified into two major categories: (1) Prime or personnel hours; (2) Additional hours. In a normal eight-hour shift, each employee must account for his attendance hours. In addition to his prime or personnel hours, each operator must record the amount of additional time worked. Additional time may be defined as time expended in simultaneous operations; that is, in operating more than one machine at any one time. One machine is chosen as a prime machine for each operator and all time recorded against this machine is considered to be prime. Other machines operated at the same time are recorded on the employee time record, but as additional hours. While only prime hours are used in reconciling the eight-hour check, additional hours, when added to prime hours, make up the total operating hours worked by each employee during the period covered by the time record.

Because of certain recording problems associated with this system, employees in the Tabulating Department needed to become accustomed to the use of the prime and additional time categories. However, after a short while, they became accustomed to them, and this form of recording work performance has been very sucessful. At this point, it should be noted that the minimum amount of time reported on the employee time record is 1/10th of an hour. It did not seem desirable to go to the trouble and expense of recording operations of shorter duration. To reduce recording effort, a form was attached to each machine for the sole purpose of recording time less than 1/10th of an hour. There was no attempt to cost this information to any specific program, only to include it in "overhead" to be prorated later among the users. It was found that most of the so-called "short runs" were additional operations and did not interfere with the employees' prime time or with his subsequent eight-hour check. When the time expended in "short runs" is needed so that an employee may account for all of the attendance hours, it is permissible to record short-run time. It is identified by a special operation code. Elapsed time is taken directly from the individual machine sheets. The time as recorded on the employee record is not used, except for the eight-hour check.

The recording of work performance is necessary for a work measurement system:

(1) To record machine utilization by type and number.
(2) To record the time expended on each program or application.
(3) To account for and record the time expended by each employee and subsequently their efficiency when actual time is compared with standard performance.

The recording of work performed on a machine requires only that the specific machine be identified. The task of identifying specific jobs is, however, slightly more complex. To do so, Carter Carburetor set up a number of major programs such as payroll, standard cost, inventory control, manufacturing control, order writing, and invoicing. These major programs were identified so that cost could be allocated to them specifically. Each major program was broken into two subclassifications. The first classification, and a part of the job number, represented a breakdown of the primary elements involved in the program. What constitutes a primary element is a matter of choice. However, since the end results are to apply costs to each of the elements and to evaluate their effectiveness, it soon becomes an easy matter to determine the so-called primary elements. The second subclassification is not a part of the job number but is associated with the operation of the equipment. In order to apply standard operating rates to each type of equipment, it is first necessary to describe the operation, particularly where a different standard rate may apply. Then selection of a series of operation codes does not present a particular problem, but is vital to the use of work standards.

It is our intent that efficiency will be measured in the future on the basis of pre-determined job standards. However, for the moment, we are content to measure efficiency on the basis of operating speeds of the equipment, applied against a certain work volume and adjusted by a personnel factor and the percent of efficiency desired. Though it may be open to criticism, a flat 20 per cent factor is applied against all machine operations. In effect, we say that we will accept 80 per cent of maximum potential as standard work performance. It may well be argued that the per cent of efficiency should fluctuate, depending upon the type of machine. This may very well be so; however, the interaction of other factors involved in work measurement restricts the amount of accuracy that is attainable, and the concern about the fluctuating efficiency is probably unnecessary. When we go to pre-determined job standards, each job will have its own efficiency factor and will not only involve the actual operation of the machines but will also include the other factors that so often decide whether a job can actually be performed at the standard rate of efficiency expected from the speed of the equipment.

The Problem of Accuracy

It cannot be over-emphasized that the entire control system depends upon the accuracy and, above all, the completeness of recording the work performance of each employee. Machine utilization, job costs, and efficiency reports will be distorted if the basic information is not correct. In the system we are using, we have found that education and discipline are pre-requisites in obtaining the desired results. While, for the most part, we depend upon each employee to record properly his work performance, the responsibility for checking and verifying the information lies directly with the immediate supervisor. To allow him to discharge this responsibility properly, the individual employee time records are key-punched daily, and by 8:00 a.m. the following morning, each section supervisor has his individual employee records and a detailed list of all cards key-punched from them. In addition, the listing shows the percentage of efficiency attained by each employee on every operation performed the previous day. This enables a supervisor to isolate any operation that appears to be out of line, either in elapsed time, identification of the job or operations code, or in the card volume. Because of the speed with which this information is made available to the supervisors, they are able, in the case of discrepancies, to contact the individuals concerned and to correct the basic records before they are used in subsequent reporting. This daily listing is a ready source of information for each supervisor about the work performed the previous day and pinpoints possible problem areas or substandard work performance by an employee.

Variance Codes

A system of measuring standard performance must recognize the existence of certain conditions that prevent standard performance. This is true in measuring the efficiency of machine operations. As a result, a series of variance codes were established and are used by each operator when they are applicable. At present, there are seven variance codes, which involve such things as machine malfunctions, jams or other processing difficulties, interruptions, non-continuous operations, and non-standard operations. All but the last two are relatively self-explanatory.

In the case of non-continuous operations, operators are often found who operate the equipment below normal capacity. This is particularly true when more than one machine is being used at a time. Because of differences in speed, one machine must wait while cards are being procesed by another machine. Where equipment is tightly scheduled, non-continuous operations are not desirable. Better scheduling will, in most cases, avoid these situations. However, in certain cases, when machines stand idle, it may be more economical to use them even though maximum efficiency is not attainable. The use of the non-continuous variance code is closely scrutinized by supervisors in the Department, and care is exercised to make sure that the use of this code is not abused.

Where an operation defies the establishment of a standard, employees are authorized to use a variance code which indicates that the operation is not on standard — a "non-standard operation." For example, the variance code is used when the volume of cards is too small in relation to the amount of setup time. If the card volume is used as a basis of determining efficiency, there would obviously be a distortion in standard performance as compared with actual. All work performance records containing a variance code are included in the efficiency reports and reported by variance code.

To be of value, information collected over a period of time about the operation of the Tabulating Department must be presented in a form that will allow for an evaluation of the conditions and situation affecting either the cost of operation or efficiency. Once again, three questions had to be answered:

(1) How effectively were we using the equipment?

(2) How much does it cost to perform the work of the Tabulating Department?

(3) How efficient are we in performing this work?

The daily listings furnished to each supervisor are an important part of the control system, since they, to a large degree, insure the measure of accuracy necessary in such a system. Their use as a management tool is, however, limited, for the most part, to the first-line supervisors. In answering the questions stated above, three reports were established: one, weekly; two, monthly. The weekly report primarily reflects machine utilization.

The Weekly Report

A series of charts reflecting the utiliza- of each type of equipment is maintained and posted from the data in the weekly report. Little attempt is made to analyze the report itself, since the charts are more significant. The information on the charts is for an extended period of time and portrays a trend. This is more realistic in evaluating machine utilization than a "point-in-time" report. All the information is plotted either in the form of a table on the chart or as a histogram. In order to measure actual machine utilization for a period of time against some standard performance, each chart reflects what is referred to as potential available time. The maximum potential available time is determined by subtracting from the total prime shift working hours in any given week, the amount of machine "downtime" occurring during that same period. This information is then plotted on the charts. Actual machine untilization during the period is then compared with this standard, and the percentage of prime shift utilization is computed. No allowance is given for an efficiency factor. Except for equipment downtime that might have occurred, the percent of efficiency reflected by the charts is based on the actual hours used as a ratio of the maximum available hours. As a point of interest, percent of machine utilization is computed only against prime shift operations and excludes any overtime or second-shift operation. This is predicted on the fact that a satisfactory percent of machine utilization must first be attained on the primary shift before extra shift operations become economical.

Each chart is designed to record machine utilization for one quarter or three months. The average for the past quarter is also brought forward and portrayed graphically on the chart for the current quarter. In addition, all charts for previous quarters are maintained, allowing for an analysis of machine utilization over an extended period of time and for the measurement of any significant variances. These charts are instrumental in determining whether or not existing equipment should be released or additional equipment acquired. Since the trends of past performances are often an important supplement to the projection of future requirements, equipment-needs can be anticipated in advance of their actual requirements. The charts which visually portray the machine utilization are reproduced weekly, and copies are distributed to those persons most vitally interested in the operation of the Tabulating Department.

The Monthly Report

Two reports are prepared monthly: Job Cost and Operator Efficiency. In determining job cost, standard charging rates have been determined for each type of equipment and for each classification of personnel in the Tabulating Department. This rate is expressed as a cost per hour. As mentioned previously, the salary cost includes only the salary paid to the employee. This hourly standard charging rate does not include cost of fringe benefits or overhead.

The hourly cost per machine is derived by dividing the total monthly cost by the average number of prime shift working hours during the month. Such a method of determining hourly machine costs implies that the only way to recover the monthly cost of the equipment is to use it during every possible prime shift hour during the month. This also means that any cost resulting from idle equipment must be absorbed by the Tabulating Department and will eventually end up as unapplied cost. This, in itself, is a form of efficiency measurement. Since the hourly cost of the equipment is based on a standard hourly charging rate, it is to the advantage of the Tabulating Department to use the equipment on an extra-shift basis, but only after all of the primary hours available have been used. The monthly job cost reports are broken down by program and within a program by the primary elements. The costs within the major program and primary elements are further broken down by type of machine, and they include both machine cost and salary cost. A total of the cost is given for each of the primary elements with the program, with an over-all cost figure for the program that month.

Little attention is given to those operations which represent a small cost. However, for those programs and primary elements that represent a significant cost, comparisons are made against previous periods. The procedure is reviewed for possible method improvements which will reduce costs. In addition, the monthly cost report is used to distribute costs to the various functions using the services of the Tabulating Department.

When the annual budget is prepared, the Tabulating Department is, of course, considered and provided for. Throughout the succeeding fiscal year, actual cost versus budgeted expenses are reported to the functions using the Department. Before the next fiscal year, a system of indirect costs application will be designed and future monthly costs reports will reflect the total costs of the Tabulating Department. It has already been decided that in no case may the standard charging rate for machines and personnel exceed competitive rates quoted by companies presently in the business of providing tabulating service.

The second monthly report is the Operator Efficiency report which reflects, by machine type and operation, the amount of time expended by each operator, and the amount of work load expressed in the form of card machine type and operation. The operations having a variance code are reported separately, so that the reason for sub-standard performance can, to a degree, be explained. Of course, it is recognized that during a month the efficiency of the work performance of an operator will naturally fluctuate somewhat.

While recognizing that the Operator Efficiency report has certain limitations and that a certain amount of judgment must be exercised in evaluating it, it still is a good tool for determining efficiency of performance. If nothing else, it has certain psychological advantages. Each employee is aware that his work performance is being measured. The report, therefore, acts as an incentive. On the other hand, it must be remembered that the source information is only as reliable as the honesty of the operators and the amount of audit given the information by the supervisors.

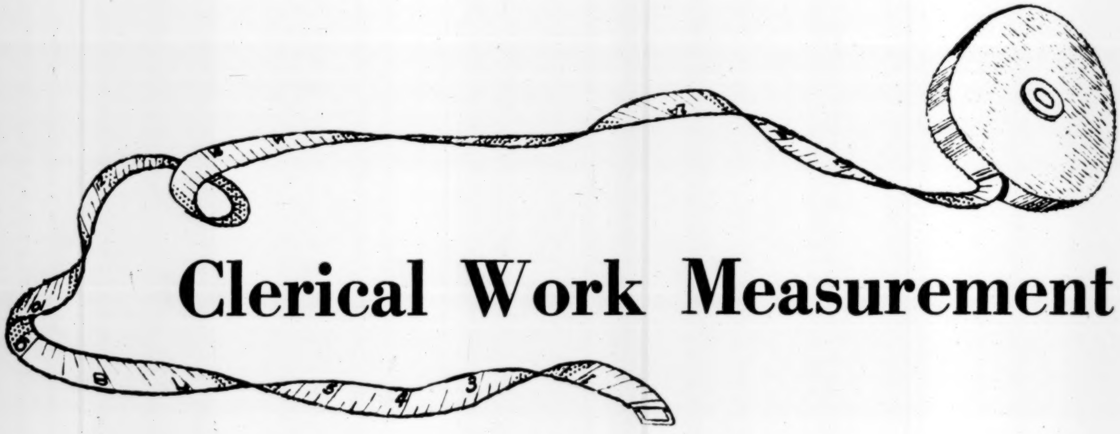
It has been our experience over the past eight months that the Operator Efficiency reports are fairly reliable and a good measure of employee efficiency and the adequacy of standards. In time, the reports may become even more meaningful and may be partially instrumental in raising the general efficiency level of the entire Department.

Results to Date

The control system described above is not ideal, nor is it necessarily the most practical system. It has, however, already achieved some excellent results for us, and we feel that with further refinements we can reduce the cost of maintaining this system and further increase effectiveness. To date, and even considering the cost of implementing this system, we have gained substantially more in direct savings than has been spent so far on this control system. We have saved by releasing some equipment and by increasing workload without adding personnel or equipment.

The purpose of any control system is to control. There must be some correlation in the amount of control and the thing being controlled; between cost and efficiency. In our particular situation, and in the light of our costs, the extent to which we exercise control over these costs is justified; in fact, necessary. We are at the moment exploring other techniques of work measurement and machine utilization. Among these are ratio-delay studies and pre-determined job standards. In time we hope to reduce the amount of work performance that must be recorded and depend more upon standard work performance figures, applied to either fixed or fluctuating work units. **s/p/a** *by William C. Nickell*

Evaluation requires an equitable system of measurement



Clerical Work Measurement

▶ The subject of work measurement brings many implications to mind. Management personnel visualize a whole new field which can be extremely valuable but in which little has been done. Methods and consultant personnel recognize it as a well-developed and successfully applied activity in manufacturing areas, with a remarkable potential for clerical operations. Clerical employees, on the other hand, generally consider it only as a term of reference with which they do not have direct contact.

Scientific management has streamlined factories, but it has been only recently that the principles of scientific management have been applied to streamlining offices. Today large corporations are taking office production out of the stepchild status and giving it the same careful attention they have long given to factory production.

There are many definitions of work measurement. The definition used here indicates that it is fundamentally a management and supervisory tool.

> "A method of establishing an equitable relationship between the volume of work performed and the manpower utilized in completing that volume."[1]

The Need for Measurement

The establishment and evaluation of economical improvements, essentially a management function, requires an equitable system of measurement. Adequate control of employee performance as well as staff requirements depend upon an adequate measuring system. The scheduling of manpower and facilities also require a measurement system.

Establishment and recognition of satisfactory work volumes can greatly increase job satisfaction so that employees also can benefit from a well-planned and executed program of work measurement. Planned

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[1] *A Work Measurement System*. Washington: Bureau of the Budget Publication, Superintendent of Documents.

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and scheduled operations eliminate inequalities in workload and minimize employee personality differences. Employee skills can be more equitably utilized and compensated.

By bringing employee time factors and output factors together at the operating level, we get work measurement. We usually keep records of work loads and attendance, and each such record is valuable as a separate entity. Each can be consolidated into a comprehensive cost evaluation. But, unless these records are combined in such a way as to show the relationship between manpower input and product output, we do not have work measurement.

Types of Work Measurement

There are various types of work measurement. A work distribution study is a quick, inexpensive way of relating employee effort to time consumed. It shows the relationship between volume of work performed and manpower but not as accurately or conclusively as in a measured system. It is primarily an historical record of what is being done.

Work distribution lists can be maintained by each employee in a given operational area for a specified time. The lists are subsequently summarized on a work distribution chart, which, through analysis, can be used to develop improved operations and serve as a continuing measurement of effectiveness. Timing is applied by each employee and, therefore, is not conclusive or evidence of what the situation should be. A work distribution chart is a good starting point for a more conclusive study. It can be developed with a minimum amount of specialized knowledge. It provides an easy method for equalizing workloads, for eliminating or combining unimportant tasks, and for improving flexibility and eliminating duplication.

Statistical quality control for ready reference is another medium for measuring clerical activity. Statistical techniques for determining operational efficiency have been developed and applied quite successfully in a number of companies. Statistical quality control provides a direct relationship between employee output and labor input, but its application is limited to those operations that offer specific qualifications.

Nearly everyone realizes that 100 per cent verification of data is impractical. Inspecting or verifying only a sample relieves pressure and monotony and actually results in a higher quality inspection. Thus, samples taken at irregular intervals from any output batch should be a good representation of the accuracy of the entire batch.

Recording the results of random samplings on a Unit Control Chart is comparatively easy and provides a continuing record for quick reference by both supervisor and employee. The chart itself motivates employees to improve even as it serves as a control over production and errors. Such charts can be maintained for individual operators or for groups.

Maximum work measurement requires the development and application of standard time data. Measurement by standard time data is more difficult but probably more beneficial because it is more exact and objective. Factory production operations are measured in this way traditionally. This, of course, is not the case in the office. This is understandable though, because highly repetitive production operations of the type usually found in factory production lend themselves to standard time data measurement, whereas the average clerical job is a mixture of activities which cannot easily be measured with a stop watch.

Admittedly, work is work, and can all be expressed in terms of man hours, with or without a tangible product. There are perhaps only two types of work that can be regarded as outside the scope of measurement: creative work and decision-making. Even these could probably be measured but it is impractical to do so. Drafting, designing, composing, and supervising fall into these categories. Standard unit time values for the majority of office clerical activities can, however, be developed, although there is no useful purpose for measuring some; for example, the work of a receptionist.

Basic Data

Determining how much an employee should produce or what constitutes a good day's work, is a matter for accurate, careful analysis. It must be done by men who are earnest, honest, competent, and impartial. It should result in time standards which are accepted as correct by both the employee and management.

Basic time data are first established for all elements in an operation and then used to develop a standard time for that operation. Operation standards can be accumulated by areas and can be used to indicate staff requirements and to prepare performance and control reports. Internal development can be handled by using motion study filming or by maintaining records of performance under varying conditions and averaging the results over a period of time. Pre-developed basic time data may be secured from outside sources.

At first glance motion study filming may seem impractical but in actual practice is not difficult or too costly. Technical filming competence is not essential. The aim is to get a simple factual 16-millimeter film record of an operation. A measurement device such as a wink counter can be located on the job to provide a time record. Later, the film can be studied in minute detail and a record of basic time data computed. A by-product result is that at the same time that time data are being secured, a general systems improvement analysis can be made. If done properly, motion study filming is time consuming and requires considerable concentrated effort because accurate time measurement data require the averaging of multiple time observations on the same job. However, creating and maintaining actual performance records either by an analyst, a supervisor, or an employee himself in order subsequently to develop average time data is time consuming and costly too. For accurate results an excessive detail of input and output data may be required and, of course, the resulting mass of data further requires careful study.

A question often asked about office work measurement today is, "Why use engineered performance standards?" An arithmetical averaging of clerical output over a period of time provides "yardsticks" more cheaply. If the source data are nothing more than employee output, performance standards are derived from historical records and not from objective data. The standards show what was actually produced but do not indicate what should be expected. They set a goal below which the staff should not fall rather than one which it can and should attain.

Engineered performance standards can be obtained from outside sources. The cost is high but may be more economical in the long run. These sources are generally management consultants who have concentrated on work measurement, and who have available programs of reliable time and production standards. This is the type of program in which I had experience and, although it cost in the neighborhood of $50,000 plus consultant engineer expenses, the direct savings amounted to many times the program costs.

A Program

Our program was a central corporate staff operation. The divisional presidents announced the program to their staffs and supported it wholeheartedly. The work measurement personnel reported to the corporate group but were physically located in company divisional areas. They worked with divisional supervisors to develop detailed charts of all clerical activity within those areas. The charts were used to establish the elements in each operation. Time standards for each were developed.

A manual of standard time data developed by our consultant was used. It was complete and up to date and included revised time data developed through extensive experience with new developments in office equipment. The "standard time" then is an average of numerous operators' time on the same type of operation in a variety of companies, and includes allowances for personal needs, vacations, sick leave, peak loads, etc.

The work measurement staff developed staffing and methods improvement recommendations as well as monthly control and performance reports. Differences of opinion between line supervisors and the work measurement staff group were resolved and complete concurrence secured about the results. This included potential methods improvements which were either implemented immediately by the line supervisors or referred to divisional methods departments for subsequent investigation and application.

The work measurement staff group presented its findings to top division managers for acceptance. When approved, the implementation became the responsibility of the operating supervisors. True, the work measurement staff group soon became known as efficiency experts, head shrinkers, and psychoanalysts. While the group was quite generally resented at the beginning of the study, through the practice of good human relations and the demonstration of a sincere desire to assist rather than direct, it eventually secured full cooperation. In many cases, actual friendship with divisional supervisors resulted. The staff group did not have any contact with the line and was not involved in some subsequent personnel and union problems that resulted.

The use of good outside consultants can result in a highly successful program of clerical work measurement, as evidenced by our experience and in our Akron branch, where it has become a means of making major cost reductions.

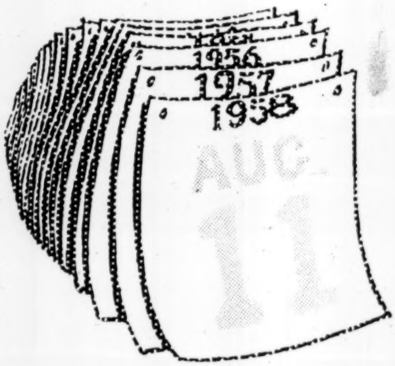
Summary

A practical evolution to an office clerical work measurement program then might be to make a work distribution study and to secure performance data from which some statistical quality control and general work measurement can be developed.

We as systems and procedures people can do much individually and collectively to outline to our management people the value of clerical work measurement. Improved methods and techniques are the only realistic means of coping with clerical production problems. The measurement of clerical activity and the establishment of accurate requirements with adequate control features provide a valuable means for improving productivity.

A precise use of tools such as work measurement can make a vital contribution to the common welfare. It helps to encourage, build, measure, and coordinate that dynamic force - human endeavor As we advance in this technological age, we should never lose sight of this most precious asset. **s/p/a**

Electronic Data Processing's



▶ Where does electronic data processing stand at the end of its first decade? The concensus of what we read and hear seems misleading. The fact is, EDP is on very solid ground.

By and large, the original end result goals of the first users of electronic data processing have been attained and, in some cases, exceeded. The original statements of equipment performance have been proved both with regard to function and reliability. Some mistakes have been made, however, in systems design, programming, and system management. Here the errors have been costly and have plagued just about all the firms that pioneered in the application of EDP to business. There is a strong feeling that the consistency and magnitude of these mistakes are being associated by most businessmen today with something inherent in EDP for business use. We are, in fact, in a period of disenchantment about EDP in business, a period in which you find many people who agree that the computer has been oversold. This is an unfortunate and unwarranted situation. It is generally unfortunate in that it will most certainly delay the computer's progress in business. It is further unfortunate because it can be catastrophic to companies which fail to make proper decisions about using and experimenting with these advanced business tools. It is, in fact, possible that companies which are not actively planning for electronic data processing today will be out of business by the time the second decade of EDP ends. This does not mean that if a company does not have a computer, it will automatically fail. It does mean, however, that a company is flirting with disaster if it does not have people of experience and authority studying the applications of EDP.

by W. K. Drake

Second Decade

Electronic data processing presents a challenge to both business and the computer industry

The First Decade

Before we can put credence in the above picture for business computers at this first-decade milestone, we must determine just what happened to EDP in business during the last decade. We must look objectively into what makes the record that seems disappointing to so many.

Let us look back to the period immediately following the war. Ten short years ago, the first commercial company efforts were undertaken to investigate, develop, and perfect basic electronic techniques and circuits for arithmetic and logical manipulation of digital information. This work was very basic in nature and stemmed directly from similar work done for the military during the war.

Engineers were learning how to store data electronically and to read it back. They were learning how to process information electronically; how to use available components in ways far different from those for which they were originally designed. Their goal, of course, was the creation of an all-electronic, stored-program computer.

The sponsor for most of this work was the Federal Government, particularly the military. This interest, supported by millions of dollars in development contracts, was the principal reason for the phenomenal rate of progress made.

The effects of this one-sided beginning became unexpected and major influences in commercial adaptations of EDP. So the only customer of consequence, the military not only paid the early bills; he shaped the industry.

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It was in the computer development contracts that the military people defined problems to the extent that they supplied complete functional specifications for a machine to solve a problem or a set of problems. The development engineer was not particularly concerned with analyzing the problem to be solved. His prime challenge was to design a machine to meet customer specifications. Obviously, the computer engineer was not a business systems man. Beginning with 1950 then, computer development engineers were confronted with a bewildering situation. Business and industry generally, and business machine companies specifically, became almost simultaneously aware of the exciting potential of machines which could process business data automatically at electronic speeds. The engineer, confident of the ability of his machine to perform accurately and reliably any arithmetic or logical operation, knew on the other hand nothing of the problems which business must solve as part of its regular routine. He was, however, intimately acquainted with his flip-flops and gates, his mercury-delay lines and magnetic drums, his multiple times and checking techniques. He knew exactly how long it would take to add a column of one million eleven-digit numbers.

When the amazing speeds and potential of electronic equipment were first realized, feature stories appeared in the newspapers. A sort of mass speculation started among business people, based on some simple extensions of microsecond arithmetic speeds to payroll processing, memory access times to dynamic inventory control and, finally, the total application of "giant brains" to business data processing. There existed, however, a communications gap between the computer engineers and businessmen, which was not bridged even after the business equipment companies began earnestly to develop electronic equipment for business. Yet, the dollars began to flow and electronic computers began to move into business. The nation heralded it as something akin to a second industrial revolution. The word "automation" was on everyone's tongue. Predictions about astounding economies that would come from the benefits of electronic speeds in payrolls, inventory control, and other accounting operations were voiced with confidence. Sales efforts in electronic data processing equipment assumed the proportions of a crusade.

1954 - 1955

In 1954 and 1955, as the first large-scale computers to be used for business problems were delivered, individual companies that led the way spoke with enthusiasm and confidence of their EDP programs. Aggressively, but somewhat naively, they tackled the huge new assignment. As they progressed, an active "scuttlebutt" circuit began to crackle throughout the business community. EDP became a universal topic of management conversation. The circuit picked up some highly optimistic and publicly stated goals of these first users. The business machine companies added sparkle to the predictions. The statements of both were amplified by the press, by consultants, and by the business community itself. The whole EDP program began to snowball - at least, verbally.

The Snowball

As the snowball picked up momentum, the early users began to encounter their first realities with the computers and some of these realities proved sobering indeed. It began to look as if no one in business really knew how to use these computers. The gap that existed between designer and user became apparent. There was still no real understanding of business systems application by the machines people who were still largely engineers. And, on the other hand, there was not as yet a full appreciation of the subtleties of the machines by the people in business who were trying to use them. These people reacted to their problem in a consistent manner. They ceased all but a minimum amount of public comment and went to work. So, while the scuttlebutt circuit continued to buzz merrily, the one source of really valid information, the initial users, dropped off the line. In spite of this, the circuit soon began to rumble with new items, stories of trouble and failure. It is interesting that during this period (1955-56), when business men were first beginning to lose confidence in EDP, the first real understanding of its application to business problems was being developed.

During that period, the computer companies spared no expense in working with and developing the equipment for business. The trouble did not stem from the equipment itself, however, but from the unrealistic approach that was made to its application in business. A supplier's recommendation at that time might have gone something like this: The XYZ 818 can give your management the answer it needs. In the process it can trim your clerical and machine costs by anywhere from $100,000 to a million dollars in the first year. The 818 is the most advanced business tool yet developed. It is backed by fifty years of experience with systems problems in business. So, when you buy a XYZ 818, you not only choose outstanding new equipment, you also join force with a group that is working at the frontiers of business data processing.

Programming, they further said, is a straightforward thing. The most practical approach is through members of your staff who know *your* business problems. What kind of people make the best programmers? Why, anyone who has evidence of orderly thought processes. The supplier, the businessman thought, could make programmers out of these people in a short time; two weeks was needed for supervisory people who would not work with the equipment in detail and a few more weeks for those who would actually do the coding. This approach provided almost everything except a few key ingredients: an absolute necessity for expert systems and procedures design throughout an organization, plus a thorough understanding and knowledge of the subtleties of efficient machine programming.

Some Original Goals

The situation described above, the writer believes, was largely responsible for many of the problems that beset commercial electronic data processing early in its first decade. The potential of the machines themselves far outdistanced the ability of both sellers and would-be users. The equipment itself has demonstrated consistently high levels of performance. The machines work well. The potential is there. The fundamental facts upon which initial estimates and goals for EDP in business were based are still correct. And now, at last, some pioneers are quietly attaining, and in some instances surpassing, these goals. In most cases, original users are expanding their use of EDP.

Misinformation

The scuttlebutt circuit continues to be a source of information about EDP in business. The previous excesses of optimism are being replaced by invalid information that would label EDP as a fizzle. EDP for business is here to stay. The nature of individual company achievements in their use suggest that those who choose to remain uninformed bystanders are, at best, dealing themselves out of the biggest single area of advancement available to business today. At worst, they are condemning themselves to competitive catastrophe.

The Second Decade

Where do we go during this second decade with EDP? The challenge is two-fold. American business must develop a new type of administrator who is trained to convert or invent production and business methods for effective use of data processing tools. Among other factors that are contributing to the increasingly efficient use of EDP is the growing ability to design and implement systems and procedures matched to the ability of the high-speed computers. This ability must be advanced by the new type data processing administrator. Also, the computer industry must continue to improve the equipment by making it more compact, less expensive, and increasingly efficient. The industry is hard at work trying to do just that.

As we look into the next decade with EDP, some of the developments that we can expect are as follows:

We can expect to see transistorized computers become more common. They will be about one-tenth the size of present computers and will operate two to four times faster. They will cost less. Smaller, less costly computers will encourage purchase.

We can also expect new peripheral equipment for input data, such as units which collect data on the production line. This equipment will transcribe such information into machine-usable form.

Automatic coding and programming techniques and mass-storage methods will become increasingly practical. Machine-aided design, where one computer assists in the design of another, will make the tailoring of special purpose equipment and systems efficient and practical.

Character-reading input equipment will be in common use thus eliminating many translation and intermediate steps. Document handling equipment will become available. Printers will be quieter and faster. Some machines will incorporate micro-programming, thus making more efficient computer utilization possible for certain applications.

Magnetic core memories will be larger and faster with cycle times in tenths of microseconds. Some may take the form of deposited magnetic material and multilayer printed circuitry. Cryogenic memories and logical elements will be in use. Micro-circuit techniques with components, including semi-conductors, deposited on circuit boards, will be commonplace. Reliability will be taken for granted and maintenance will be on the basis of periodic checkup.

The Opportunity

The tools of electronic data processing are getting better and better. This means that the systems and procedures people of business and industry are standing on top of one of the greatest opportunities in commerce. Their job is to fill the critical vacuum that exists between the full potential of electronic data processing equipment and the needs of business. They must direct the function that collects, processes, and reports the facts of business operation at electronic speeds.

The above challenge cannot be met by standing safely on the sidelines, watching the parade. The tools are here. Some of their achievements in business have been demonstrated and recorded. The next decade with EDP requires leadership, knowledge, experience, and initiative. He who waits for EDP problems to be solved for him is at the same time solving the problem of his own future: no problem, no job. **s/p/a**

S&P Book Reviews

"Management for Engineers," *by Roger C. Heimer, McGraw-Hill Book Company, 330 West 42nd Street, New York 36, 466 pp., 1958. $6.75.*

While the title of this book is "Management for Engineers," its contents are of interest to systems and methods people. Rare is the methods man who does not at some time encounter problems covered by such chapters as "Productions Costs—Standard Costs," "Interest and Time," "Depreciation," "Inventory," "Standards," and "Labor and Equipment Costs." In fact, systems people will find that most of the 17 chapters are useful and applicable to their work.

The author covers rather technical matter in an easily understood manner. Essentially a textbook, the reader grasps the meaning and method for solving problems with a minimum amount of reading. For example, the subject of time payments and capital recovery is covered in 17 pages of the chapter, "Interest and Time" and yet covers the subject adequately.

Each chapter has a bibliography for the reader who desires to explore the subject further. Sufficient illustrations prevail to cover the subject discussed.

The chapter on "Money Flow in Business Enterprise" is interesting reading about the financial aspect of a business organization. Too often, the engineer and systems man are not informed about the balance sheet or the source of an organization's funds. This chapter helps one understand the movement of corporate funds through a mythical business firm.

In the chapter on "Management Decisions" the author states that "Procedures are developed for the purpose of eliminating the need for making decisions. The management believes that some uncertainties are sufficiently frequent that a procedure is required to handle them." This chapter covers many areas where decision making is required by management. *(Reviewed by Victor Lazarro).*

"Automation and Management," *by James Rieser Bright, Harvard Business School, Division of Research, Soldiers Field, Boston 63, Massachusetts, xv + 280 pp. + 16 pages of photographs, 13 appendices. 1958. $10.00.*

Automation and Management is a comprehensive report of a field investigation of the managerial problems of automatic manufacturing, such as materials used in the manufacturing process, volume, complexity of the manufacturing process, and the gradual installation of the automatic equipment itself. Examined are the potentiality, impact, and limitations of automation to management in production areas only, excluding such aspects as data processing. Professor Bright consulted, in addition to current professional writing, top and operating management, staff specialists, and records of thirteen United States factories identified in 1954 by experts as outstanding examples of automation.

Automation is seen as a problem in top managerial planning and this concept is developed in three parts of the book: I, "The Nature of Automatic Manufacturing," attempts to create an understanding of the concepts of mechanization and automaticity in manufacturing;

II, "Experiences with Automation," describes the evolutionary processes of automation experienced by management in the thirteen chosen firms and defines 17 levels of mechanization; III, "Critical Areas of Automation," explores four important areas of automation - maintenance, personnel, sales, and management.

Automation and Management is the result of a careful study with limitations clearly defined. The thought-provoking text is adequately supplemented with graphic materials, photographs, and appendices which include such exhibits as excerpts from the detailed but not widely available description of the origin of Ford's moving assembly line, advantages and disadvantages of automation as stated by Ford officials, typical job descriptions and operating procedure instructions for workers in a bakery's automatic bread line, bulletins published by an oil company to acquaint employees with new mechanization, and comparison of labor costs.

This penetrating overview of management's responsibility for designing industrial automation programs gives insight also into the problems that may be encountered in data processing. For an understanding of what automation means in different industries, this book is required reading. Its content has many parallels for data processing. *(Reviewed by Eleanor Maliche, Ph.D., Eastern Michigan College.)*

"A Management Guide to Electronic Computers," *William D. Bell. Toronto, McGraw-Hill Company of Canada, Ltd. 402 pages, 1957. $7.80.*

Written primarily for those in higher management who are responsible for deciding whether or not to install an electronic computer, this is a helpful book. In relatively non-technical language, it describes what the machines can do and not how they do it. The author strongly recommends that a first step, when considering purchasing a computer, is to appoint a committee that is representative of all departments, to study it. All departments that might use it should describe possible applications. At this time, companies are also urged to get outside advice in addition to the technical assistance given by manufacturers of equipment.

For anyone interested in exploring the possibility of getting an electronic computer, this is a worthwhile book. References are made throughout the book to actual installations, and it indicates that they are becoming increasingly important, particularly in large companies. It would appear that further developments are making them more and more practical for smaller organizations. *(Reviewed by John S. Hill, C.A., Toronto, Ontario).*

"Office Automation Applications" *by R. Hunt Brown, Automation Consultants, Inc., New York, 1958.*

When the author compiled the first edition of Office Automation in 1954, he made a much-needed and conscientious effort to cover the subject comprehensively. At that time, however, there were very few applications of the new electronic machines about which to write.

Time and a tremendous amount of research has gone into the preparation of this handbook, which is semi-technical in nature. The results justify the monumental effort, for this handbook warrants the attention of any individual interested in office automation.

Some of the material bears a similarity to some of the ideas expressed in the author's earlier work. However, in most instances the ideas warrant reiteration.

Part I of the text includes a general review of office automation. Part II covers the rapidly growing field of operations research, including a case study. Part III is the largest section of the book and deserves the most attention. The case studies include background data, feasibility and systems planning information, detailed descriptions of the applications, a discussion of special problems encountered, and a summary and evaluation.

Part IV contains a review of major equipment in office automation, plus indexes showing where the use of this equipment is discussed in other sections of the book.

Qualitatively and quantitatively, this handbook is a most comprehensive text of case studies of office automation. The author is to be congratulated on the results of his prodigious effort. *(Reviewed by Thomas G. Rizzo).*

"Sampling Techniques In Accounting," *Robert M. Trueblood and Richard M. Cyert. New York: Prentice Hall, 1958, $7.50.*

This book might very well be described as a guidebook to the application of statistical techniques to accounting and auditing. It is relatively free of mathematical symbols and jargon so that it is quite readable. The book is divided into three sections: (1) A general review of statistical concepts, (2) The application of statistical methods to accounting and auditing, and (3) Nine case studies. The book concludes with a ten-page bibliography of related reference.

Members of a small group of Pittsburgh statisticians and accountants who are studying the application of statistics to accounting and auditing, the authors are qualified to write such a book as *Sampling Techniques in Accounting* and handle the materials clearly and logically. Mr. Trueblood is a partner in the Pittsburgh office of Touche, Niven, Baily, and Smart and is chairman of a committee of the American Institute of Certified Public Accountants. Mr. Cyert is a Professor of Economics and a member of the American Statistical Association. *(Reviewed by Edward Stamp, M.A., C.A., Toronto, Can.).*

Worth Reading

"Machine Accounting and Computer Development in Russia: A Fast-Growing Branch of Industry." *The Accountant,* January 11, 1958, pp. 28-30.

Now more than a quarter of a century old, the Russian calculating-machine industry is reported to be in the midst of an expansion program designed to quadruple output of 1956 by 1961. The output includes ten-key adding machines, calculators, and electronic computers. It is reported that in the next few years, 32 factories will be built for the production of electronic computers and the latest types of automatic industrial equipment. However, the production of the first computer designed specifically for accounting purposes is not scheduled until 1960.

"Friendly Competitors Pool Resources in EDP Center," Ragnar E. Anderson, *American Business,* April, 1958.

Explains how four competing insurance companies in Hartford, Connecticut agreed jointly to use a computer. It describes the way costs are shared and programs developed.

"Teach Us How To Save Money and We'll Do It," Stuart N. Phillips, *American Business,* April, 1958.

Describes the communication cost-reduction training in Olin Mathieson Chemical Corporation. Fifteen hundred people have been given one hour of instruction in groups of 25. Expected savings are from 15 to 25 percent of communications cost.

"Financial Reporting Implications of Accounting and Electronic Data Processing," W. Stewart Hotchkiss, *The Controller,* April, 1958.

Observes that the first computer applications were processes with well-defined routines. It sugests that greater returns will be realized if computers are used in more highly integrated systems. It identifies the following areas where management can benefit from a more sophisticated use of computers:

Measuring profitability of product lines
Maximizing return on investment
Optimizing use of facilities
Projecting cash flows
Budgeting capital expenditures.

"Cost Accounting and Computers," Maurice S. Newman, *The Controller,* May, 1958.

Detailed examination of (1) the design of a basic cost system, and (2) how computers can be used in such a system. It discusses the following steps in establishing a cost system:

Construct a chart of accounts
Prepare budgets
Select cost units
Select product units
Establish conversion factors
Determine standard costs
Determine operating variances

It describes two computer applications to cost systems.

"Review of Defense Contracts for Accountants," Paul M. Trueger, *The Controller,* May, 1958.

General introduction of the fundamentals of Federal requirements on defense contracts. Considers unallowable costs, allocation of indirect expenses, types of contracts, types of financing, and renegotiation.

"Organization for Effective Administration," J. J. Macdonell. *Cost and Management,* January 1958, pp. 16-25.

Administrative methods should be reviewed regularly either by a staff department or by an outside consultant. Undue emphasis need not be given to mechanizing to cut office costs. More important, says the author, is the intelligent appraisal of the procedures themselves. Tangible economies produced by methods are not as important as those produced through the introduction of more effective organization planning and more capable people.

"How To Cut Costs With Cost Accounting," Norman H. Wood, *Management Methods,* April, 1958.

Brief introduction to the theory of cost accounting. Usual benefits of a cost system are: cost consciousness, improved inventory control, and ability to compare actual costs to a standard.

"Where To Look For These Big Cost Savings," Robert C. Trundle, *Management Methods,* April, 1958.

Discusses the following as likely sources of savings:

1. Advisory functions
2. Records and reports
3. Marketing
4. Inventory
5. Materials Handling
6. Production Methods
7. Quality Control
8. Salaries and Incentives
9. Maintenance Costs

"Don't Ship Money Down The Drain," *Modern Office Procedures,* March, 1958.

A brief illustrated description of a freight routing card file showing:

(1) which carriers go where, (2) how much they charge, and (3) how long they take. The example company ships to 2500 places. Savings of $40,000 yearly in freight costs are claimed.

"Faster Shipments By Word of Mouth," *Modern Office Procedures,* April, 1958.

Detailed ilustrated description of how a liquor distributor handles 600 phone orders daily, with delivery the next day. Salesmen's calls are connected to recorders. When a recording disc is filled, it is sent to an invoice station where customer and product cards are pulled. A Flexowriter is used in conjunction with automatic adding machines to prepare invoices and a shipping form.

"High Speed Receiving," *Modern Office Procedures,* May 1958.

Purchase orders are prepared from prepunched tapes (items and vendors). Simultaneously by wire, punched tapes are created in receiving and machine accounting. When material arrives, the receiving area wires a tape to machine accounting where the purchasing tape is matched to it via punched cards.

"This System Allows Only One Error in 160,000 Billings," *Modern Office Procedures,* May 1958.

Detailed account of a punched card process used to prepare 80,000 billings a year. Billing is done centrally for a 10-plant building supply company.

"How We Developed a Records Program to Meet Current and Future Needs," Harry S. Hughes, *Office Management,* April, 1958.

Describes the records program of Smith, Kline and French Laboratories, a pharmaceutical company with 2,500 employees. Details of equipment used and storage layout are given. The program has been developed in four years at a cost of $30,000.

"Invoicing by Machine," John L. Stratton, *Office Executive,* April, 1958.

Describes briefly an invoicing application on an IBM Cardatype. A restaurant supplies distributor averages 100 invoices daily from inventory of 8,000 items. Prepunched item and customer cards are used.

"Systems Audits — The Safe Way to Cut Clerical Costs," Ralph W. Fairbanks, *Office Management,* May, 1958.

Explains a new management consultant service, an analysis of what is wrong with an estimated cost and how to correct it. It is a general description of the approach used by consultant to determine the efficiency, economy and dependability of various areas of a company.

Publications referred to above are published as follows:

1. *The Accountant,* 27 Basinghall St., London E. C. 2 England (for accountants throughout the world).
2. *American Business,* Dartnell Publications, Inc., 4660 Ravenswood Ave., Chicago 40, Illinois.
3. *The Controller,* Journal of the Controllers Institute of America, 1 East 42nd St., New York 17, N. Y.
4. *Cost and Management,* Official Journal of the Society of Industrial and Cost Accountants of Canada, 31 Walnut Street South, Hamilton, Ontario.
5. *Management Methods,* Management Magazines, Inc., 141 E. 44th St., New York 17, N. Y.
6. *Modern Office Procedures,* Irving B. Hexter, 812 Huron Road, Cleveland, Ohio.
7. *Office Executive,* Journal of the National Office Management Association, Willow Grove, Pa.
8. *Office Management,* Geyer-McAllister Publications, 212 Fifth Avenue, New York 10, N. Y.

s/p/a

The Business Cycle

Systems activities can be affected in several ways by the present aberration in the business cycle. Let us assume, however, that they will be affected only favorably; that systems men everywhere are causing their management to realize that in times of declining operations, the role of the systems man is of extreme importance.

Some of the world's leading industrial enterprises have recognized that certain advantages can be taken from low ebbs of activity. When activity slackens, the time is made-to-order for planning to do things better when the next upsurge comes.

Almost every systems man will agree that the best time to install improved procedures is when the operations affected are at their lowest level of activity. For example, if you were about to set up a new inventory control system in the toy business, you would try to launch it right after the heavy wave of Christmas buying had reduced stocks. Likewise, if you have just finished designing a better production control system, you would like to pick a time for installation when the high pressure of stepped-up schedules and rush shipments are not present to complicate conversion. You cannot, of course, keep improved systems in mothballs to await such an opportune time for installation and to think of creating an artificial calm for this purpose would be unrealistic. But, when the abberations of the business cycle bring about a slowdown of activities, the systems man should view it as a good time to go into high-gear operation.

The impact of EDP on the business world opened up new opportunities for improved processing of business data faster than most companies could take advantage of them without seriously dislocating their current operations. Now, many companies feel that if they do not adapt their operations to the electronic computer, they may fall disastrously behind those competitors who have already succeeded in weathering the period of conversion and who have arrived at the point where they can start using EDP as an effective instrument for more efficient and intelligent operations. If systems men take advantage of the present low ebb in business activities to install improved procedures, we predict that the principal effect of a business recession on systems activities will be an acceleration of programs for the assimilation of electronic data processing into the mainstream of clerical activities.

The lucky systems men are those who planned during good times to convert systems to EDP (or whatever improved techniques are indicated). They are in the advantageous position of having the ultimate in men and material available at a time when slackened operations provide an ideal milieu for such action. But, we cannot all be lucky. Some of us will have to work at making the most of the present opportunity. We are not recommending, of course, a recession just to get a breathing spell for systems experimentation. We do recommend, however, emulating the optimist who, when he found himself in hot water, took a bath. **s/p/a**

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